

CLAIMS

WHAT IS CLAIMED IS:

1. An antenna comprising:
a first planar conductor;
a first elongated conductor and a second elongated conductor, which are each substantially coplanar with the planar conductor;
the first elongated conductor having a first end electrically connected to the first planar conductor and a second end; and
the second elongated conductor, parallel to the first elongated conductor and spaced apart therefrom, having a first end electrically connected to the first planar conductor.
2. The antenna of claim 1, wherein the first end of the first elongated conductor is electrically connected to the first planar conductor by a first connecting conductor and the first end of the second elongated conductor is electrically connected to the first planar conductor by a second connecting conductor.
3. The antenna of claim 1, wherein the first connecting conductor and the second connecting conductor are perpendicular to the first elongated conductor and second elongated conductor respectively.
4. The antenna of claim 1 further comprising a third elongated conductor spaced apart from the first planar conductor and electrically connected to at least one of the first end of the first elongated conductor and the first end of the second elongated conductor.
5. The antenna of claim 4, wherein the first end of the first elongated conductor is electrically connected to the third elongated conductor by a first connecting conductor perpendicular to the first elongated conductor and the first

end of the second elongated conductor is electrically connected to the third elongated conductor by a second connecting conductor perpendicular to the second elongated conductor.

6. The antenna of claim 4, wherein the third elongated conductor is electrically connected to the first planar conductor.

7. The antenna of claim 1 further comprising a substrate and wherein the first planar conductor, the first elongated conductor, and the second elongated conductor are disposed on a first side of the substrate.

8. The antenna of claim 1 further comprising a substrate and wherein the first planar conductor is disposed on a first side of the substrate and the first elongated conductor and the second elongated conductor are disposed on a second side of the substrate.

9. The antenna of claim 8 further comprising a second planar conductor disposed on the second side of the substrate.

10. The antenna of claim 9, wherein the first end of the first elongated conductor and the first end of the second elongated conductor are electrically connected to the first planar conductor by vias through the substrate.

11. The antenna of claim 1, wherein the first elongated conductor and the second elongated conductor comprise a first element and further wherein the antenna comprises a second element.

12. The antenna of claim 11, wherein the first element and the second element are disposed in a side-by-side relationship.

13. The antenna of claim 11, wherein the second element is disposed between the first element and the first planar conductor.

14. The antenna of claim 11, wherein at least one of the first and second elements further comprises a third elongated conductor having a first end electrically connected to the first planar conductor.

15. The antenna of claim 11 further comprising a substrate and wherein the first element and the second element are disposed adjacent to opposing edges of the substrate.

16. The antenna of claim 11 further comprising a primary substrate with the first element disposed thereon and a secondary substrate attached to the primary substrate with the second element disposed thereon.

17. The antenna of claim 16 further comprising a plurality of secondary substrates attached to the primary substrate with a corresponding plurality of elements disposed thereon.

18. The antenna of claim 17, wherein each of the plurality of secondary substrates is perpendicular to the primary substrate.

19. The antenna of claim 1 further comprising a substrate and at least one conductor along an edge of the substrate.

20. The antenna of claim 1 further comprising:

a primary substrate;

a secondary substrate attached to the primary substrate and perpendicular thereto;
and

a third parallel elongated conductor and a fourth parallel elongated conductor on the secondary substrate, each having a first end electrically connected to the first planar conductor.

21. The antenna of claim 20 comprising a plurality of secondary substrates attached to the primary substrate and perpendicular thereto, each of the secondary substrates having respectively a third parallel elongated conductor and a fourth parallel elongated conductor thereon.

22. The antenna of claim 1, wherein the first planar conductor, the first elongated conductor, and the second elongated conductors are disposed on a first side of a substrate and further comprising a second planar conductor and a third

parallel elongated conductor and a fourth parallel elongated conductor each having a first end electrically connected to the second planar conductor and disposed on a second side of the substrate.

23. An antenna comprising:

a substrate;

a first planar conductor disposed on a first side of the substrate;

a second planar conductor disposed on a second side of the substrate;

a first elongated conductor disposed on the substrate;

the first elongated conductor having a first end electrically connected to one of the first planar conductor and the second planar conductor;

a second elongated conductor disposed on the substrate and having a first end electrically connected to one of the first planar conductor and the second planar conductor.

24. The antenna of claim 23, wherein the first elongated conductor and the second elongated conductor are disposed on the first side of the substrate.

25. The antenna of claim 24, wherein the first end of the first elongated conductor and the first end of the second elongated conductor are electrically connected to the second planar conductor.

26. The antenna of claim 23, wherein the first elongated conductor and the second elongated conductor comprise a first element and further wherein the antenna comprises a second element.

27. The antenna of claim 26, wherein the first element and the second element are disposed in a side-by-side relationship.

28. The antenna of claim 26, wherein at least one of the first element and the second element further comprises a third elongated conductor having a first end electrically connected to one of the first planar conductor and the second planar conductor.

29. The antenna of claim 24, wherein the first end of the first elongated conductor and the first end of the second elongated conductor are electrically connected to the first planar conductor.

30. The antenna of claim 29 further comprising a third elongated conductor and a fourth elongated conductor disposed on the second side of the substrate, each having a first end electrically connected to the second planar conductor.

31. An antenna comprising:

a primary substrate;

an at least one planar conductor disposed on the primary substrate;

a first antenna element having a first parallel elongated conductor and a second parallel elongated conductor disposed on the primary substrate;

the first parallel elongated conductor and the second parallel elongated conductor each having a first end electrically connected to the planar conductor.

32. The antenna of claim 31 further comprising:

a secondary substrate attached to the primary substrate and perpendicular thereto;

a second antenna element having a third parallel elongated conductor and a fourth parallel elongated conductor disposed on the secondary substrate.

33. The antenna of claim 32 further comprising a plurality of secondary substrates attached to the primary substrate and perpendicular thereto, each having a corresponding second antenna element.

34. The antenna of claim 33, wherein at least some of the plurality of secondary substrates are disposed on a first side of the primary substrate and a remainder of the plurality of secondary substrates are disposed on a second side of the primary substrate.

35. An antenna comprising:

a substrate;

a planar conductor disposed on the substrate;

a first parallel elongated conductor and a second parallel elongated conductor disposed on the substrate, each having a first end electrically connected to the planar conductor,

the first parallel elongated conductor, the second parallel elongated conductor, and the planar conductor located substantially in the E-plane.

36. The antenna of claim 35, wherein the substrate includes a groove at least partially therethrough between the first and second elongated conductors.

37. The antenna of claim 35 further comprising at least a third elongated conductor parallel to the first elongated conductor and the second elongated conductor, the third conductor having a first end electrically connected to the planar conductor and wherein the substrate includes at least two grooves at least partially therethrough between pairs of the first, the second, and the third elongated conductors.